

REMARKS

I. Summary of the Office Action

Claims 1-23 are pending in the application. Claims 1, 11 and 18 are the only independent claims. The Office Action has rejected claims 1-3, 11-13 and 18-20 under 35 U.S.C. §102(b), as being anticipated by U.S. Patent No. 6,065,073 (Booth).

II. Summary of this Reply

In response to the Office Action rejection of independent claims 1, 11 and 18 under 35 U.S.C. §102(b), Claims 1 and 18 have been amended to define still more clearly what Applicants regard as their invention, in terms which distinguish over the art of record. Applicants submit that Claim 11 stands allowable over the prior art for the same reasons as detailed by the Examiner in the “Reason for Allowance” of Claims 4, 14 and 21.

III. The Present Invention

The present invention provides a system and method for accessing registers of a PHY device in a network. The invention comprises an extended protocol software layer disposed between the protocol and application layer, on the one hand, and the MAC driver, on the other hand. In one embodiment of the invention, the extended protocol layer generates the PHY device register read and write commands and embeds them within standardized Ethernet data packets. The PHY device of the present invention is adapted to distinguish these register read and write command packets from normal data packets and intercept and parse them to retrieve the commands.

In this manner the present invention takes the standard read/write request signals that access the register of a PHY device, which is normally handled using dedicated data paths separate from the normal, payload data packet processing operation of the network interface and, instead, embed the access requests in a standard payload packet. The PHY device is modified to recognize the difference between those packets that are standard payload data packets containing data for

transmission on the network and those data packets that contain PHY device register access requests in accordance with the present invention.

The present invention is directed to the problems in the prior art for accessing the registers of a PHY device as networking technologies develop. For example, new network standards may require that additional registers for controlling new services may need to be added in the PHY device. Previously, such changes would require significant modifications to the MAC device and the MAC driver.

The present invention addresses these problems in the prior art by permitting a PHY device to be replaced with a modified PHY device having additional and/or different control registers without the need to replace the MAC driver and/or MAC device.

The Booth Prior Art Reference

Booth relates to a system and method for auto-polling a status register within a physical layer (PHY) interface to a local area network. The system includes an auto-polling unit which monitors activity on the management interface of the PHY device. When the auto-polling unit detects a lack of activity on the management interface for a predetermined interval, the auto-polling unit reads a first value from the PHY status register. This first status value is then compared to a previously stored value which corresponds to the last PHY status value read by the host CPU. If a mismatch is detected between these two values, an interrupt is generated to the CPU. The thrust of Booth's invention is summarized in the last line of his Abstract: "This system frees the CPU from having to continually poll the PHY status register to determine if a change in status has occurred".

IV. Response to 102 Rejections

Response to Claim 1 Rejection

As amended, claim 1 recites a system for accessing at least one designated register of a PHY device in a communications network. This system comprises a protocol and applications layer and a MAC layer. Disposed between these two layers is an extended protocol layer for

generating an access command packet, the access command packet containing an access command to access the at least one designated register of the PHY device. The system further comprises the PHY device, including the at least one designation register, for receiving the access command packet and executing the access command of the access command packet.

Applicants have amended claim 1 to clarify that the access command packet is encapsulated in at least one standardized Ethernet data packet. Support for this feature is found, inter alia, in paragraph 24 of the specification. Moreover, the current claim language makes clear that the extended protocol layer performs this encapsulation prior to the MAC layer. As noted above, this feature enables the invention to overcome various problems in the prior art as it allows the registers of the PHY device to be accessed without the need to modify the conventional MAC device hardware and/or MAC driver software should the network protocol be modified with respect to those registers.

In particular, the present invention takes the standard read/write request signals that access a register of a PHY device, which are normally handled using dedicated data paths separate from the normal payload data packet processing operation of the network interface and, instead, using an extended protocol layer encapsulates the access requests in a standardized Ethernet data packet.

In paragraph 2 of the Office Action, the Examiner cites sections of Booth (i.e., col. 9: lines 50-55 and col. 10: lines 22-34) as disclosing the extended protocol layer of the present invention. Applicants respectfully disagree. These cited passages of Booth relate to a network interface card (NIC 212) which is described as providing the computer system “with one or more links to an attached LAN (or alternatively different LANs). ...[As] the one or more links provided by NIC 212 may be coupled to different transmission media (that is, different types of physical cabling) NIC 212 is thus configured “to receive network data and convert this received data into a format recognizable by the software-implemented portions of the chosen communications protocol” (col. 10, lines 23-31). This NIC feature of Booth works to dynamically switch between different network interfaces to a LAN and to address the protocols involved.

This NIC feature of Booth is clearly distinguishable from the extended protocol layer recited in claim 1 of the present invention wherein an access command packet, encapsulated in a standardized Ethernet data packet, is generated and used to access a register of a PHY device.

Booth does not address the Ethernet protocol feature of the invention. In fact, as noted in his patent, Booth describes how access to the PHY is controlled by the “management interface [which] is defined by IEEE standards” (col. 19, lines 3-5). Booth then describes how his invention uses this management interface to conduct the auto-polling feature of his invention (col. 19, lines 13-43).

Further, Booth fails to teach (or even suggest) that the encapsulation performed in the extended protocol layer takes place prior to the MAC layer. In fact, Booth teaches away from this feature as the Network Interface Card 212 (the feature of Booth cited as being the extended protocol layer) incorporates MAC operations (e.g., item 410 of Fig. 5; items 514 and 516 of Fig. 7).

Accordingly, Booth fails to teach an important feature of the claim 1; that the extended protocol layer, and the operations it performs, occurs prior to any data being received by the MAC driver layer. This feature is not a mere design choice, for as noted above, it permits accessing a modified PHY device to occur without requiring changes to the MAC driver; thereby overcoming a serious problem in the prior art. For at least these reasons, Claim 1 is patentable over Booth.

Response to Claim 11 Rejection

As previously amended, claim 11 recites an extended PHY (physical layer) device for use in a network system, the extended PHY device including registers for storing data. The extended PHY device is capable of recognizing an access command packet encapsulated in a standardized data packet, executing the access command packet, and generating an access acknowledgment packet in response to the access command packet.

Claims 4, 14 and 21 contain the following feature which was sited as being allowable subject matter by the Examiner:

“the PHY device generates an access acknowledgment packet upon execution of the access command, the access acknowledgment packet acknowledging execution of the access command” (Paragraph 4 of the March 22, 2005 Office Action -- referenced in Paragraph 3 of the current Office Action).

Applicants submit that the feature of claim 11 wherein an access acknowledgment packet is generated, is not taught nor suggested by Booth. That is, the additional feature of the claims indicated as being allowable, that “the execution of the access command” occurs prior to the

acknowledgment is not relevant. With or without the precondition of execution, Booth does not teach (or even suggest) an acknowledgment packet as recited in claim 11. For this reason, claim 11 is patentable over Booth.

Response to Claim 18 Rejection

As currently amended, claim 18 recites a computer program product embodied in computer readable media as an extended protocol layer of a network system, for accessing at least one designated register of a Physical (PHY) device of the network system. The computer program product comprises computer executable instructions for generating an access command packet, the access command packet being encapsulated in a standardized Ethernet data packet and including an access command to access the at least one designated register of the extended Physical (PHY) device. The program product also includes instructions for transmitting the generated access command packet to another computer program product that controls a Media Access Controller (MAC) device, so that the at least one designated register of the extended PHY device can be accessed.

An important feature of the present invention is the use of a standardized Ethernet data packet. Further, inherent in claim 18 is the fact that this Ethernet data packet encapsulation occurs before access to a MAC device. That these features are neither taught nor suggested by Booth were discussed above with respect to claim 1. Accordingly, claim 18 is patentable for the same reasons as detailed above with respect to claim 1.

Response to Rejections of Remaining Claims

The other claims currently standing as rejected in this application (i.e., claims 2, 3, 12, 13, 19 and 20) are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Therefore, reconsideration and withdrawal of the rejections of claims 1-3, 11-13 and 18-20 are requested respectfully.

CONCLUSION

In view of the foregoing amendments and remarks, Applicant believes claim 1-23 to be patentable and the application to be in condition for allowance, and requests respectfully issuance of a Notice of Allowance. If any issues remain, the undersigned requests a telephone interview prior to the issuance of an action.

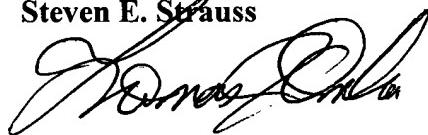
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